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Predictive models of Dirac Neutrinos

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In the first work, assuming lepton number conservation, hermiticity of the neutrino mass matrix and $\nu_\mu - \nu_\tau$ exchange symmetry, we show that we can determine the neutrino mass matrix completely from the existing data. This model predicts an inverted mass hierarchy (close to a degenerate pattern) with the three neutrino mass values, $8.91 \times 10^{-2}, 8.95 \times 10^{-2}, 7.50 \times 10^{-2}$ eV, a large value for the CP violating phase , $\delta = 110^0$ and of course, the absence of neutrino-less $\beta\beta$ decay. Continuing in the same philosophy, in the second work, we assume only $\nu_{\mu_R} - \nu_{\tau_R}$ symmetry along with a symmetry under CP transformation of the Lagrangian. As a result, only with the assumption of hermiticity of the Dirac neutrino mass matrix, we can fit all the existing data only with four parameters in this model. Scanning over the parameter space, we observe that this model also prefers inverted mass hierarchy with three neutrino mass values of $4.89\times10^{-2}, 4.81\times10^{-2}, -1.1\times10^{-3}$ eV, a CP violating phase $\delta = 90^0$. All of these predictions can be tested in the forthcoming or future precision neutrino experiments.

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